

REMARKS/ARGUMENTS

Claims 4-8 are pending in the Application. Previously presented Claim 4 has been amended to added the word of between “content” and “3-40 wt%” as suggested by the Examiner. Official Action dated September 1, 2009 (OA), page 5. Previously presented Claim 6 has been amended to present a proper Markush grouping in line with the Examiner’s interpretation and suggestion (OA, p. 5, last ¶).

No new matter is added.

Applicant respectfully requests reconsideration of the final rejections in view of the following remarks and/or arguments.

Rejection of Claims 4-8 under 35 U.S.C. 103 over Lai

Claims 4-8 stand finally rejected under 35 U.S.C. 103 over Lai (EP 0 331 047 A1, published September 6, 1989). The rejection should be withdrawn.

While the Examiner points to various pages and paragraphs of Lai’s disclosure for teachings related to various elements of Applicant’s claimed method of producing titanium dioxide and/or calcium carbonate filler-containing paper, the Examiner appears to have lost sight of Lai’s deficiencies and contrary teachings. We need not discuss conventional steps of the papermaking process from the formation of a wet pulp stock slurry to depositing the slurry on a wire screen to dewater the stock. Rather, we shall focus on Lai’s critical deficiencies and contrary teachings relative to the claimed process in order to establish that the evidence favoring the patentability of the method Applicant claims far outweighs the evidence relied upon in support of the rejection.

First, Applicant claims a method for preparing a titanium dioxide or calcium carbonate filler-containing paper prepared from an aqueous pulp stock slurry comprising (1) the pulp stock and (2) at least 0.0005 %, but less than 0.05 % by dry mass of raw material pulp of a cationic polymer containing vinylamine units obtained by 20 to 100 % hydrolysis of

the total formyl groups in a polymer comprising N-vinylformamide units (A), and a titanium dioxide and/or calcium carbonate filler (B). The paper product prepared by Applicant's method must have an ash content of 3-40 wt%. The ash content of paper is conventionally defined as the mass of residue remaining relative to the mass of the paper after firing the paper or, more generally, as the wt % of non-combustible filler in the initial paper product.

Applicant's Specification instructs that it is the interaction of its cationic polymer containing vinylamine units and the titanium dioxide and/or calcium carbonate which allows the paper made by the claimed process to retain 3-40% titanium dioxide and/or calcium carbonate using as little as 0.01 to 0.05% of a polymer containing vinylamine units (Spec., p. 1, l. 31, to p. 2, l. 5; p. 2, l. 35, to p. 4, l. 17). Nevertheless, the Examiner concludes that a process for making paper including 0.01 to 0.05% of a 10-99% acid hydrolyzed homopolymer or copolymer of N-vinylformamide and 10% TiO<sub>2</sub> would have been obvious in view of Lai's teaching. The Examiner's conclusion is erroneous because it is based on findings which are clearly erroneous.

First, Lai teaches that its homopolymer or copolymer of N-vinylformamide may be 10-99% base or acid hydrolyzed (Lai, p. 5, ll. 24-39). According to Lai, only the acid hydrolyzed homopolymer or copolymer of N-vinylformamide may be a cationic polymer component used in accordance with Applicant's claimed method (Lai, p. 5, ll. 31-39). In the papermaking process of Lai's Example 12, Lai used a vinylamine homopolymer which is not characterized as either cationic, anionic or a salt. Rather, it is merely characterized as a "vinylamine homopolymer". Thus, the Examiner clearly erred in finding that the process described by Lai's Example 12 is a process for making paper including 0.01 to 0.05% of a 10-99% acid hydrolyzed homopolymer or copolymer of N-vinylformamide and 10% TiO<sub>2</sub>.

Second, while Lai's Example 12 teaches that the vinylamine homopolymer was added to a pulp slurry containing 10% TiO<sub>2</sub> "at addition levels of 0, 0.01, 0.05, 0.1, 0.2 and 1% based on fiber" (Lai, p. 8, ll. 32-33), based on the results reported by Lai in Table 4 (Lai, p. 8), Lai states (Lai, p. 8, ll. 49-50):

It can be seen that the 7MM molecular weight poly(vinylamine) demonstrated a superior TiO<sub>2</sub> retention at 0.1-0.2% addition level to wood pulp.

That statement is consistent with Lai's teaching at page 5, lines 54-56, that "[t]he addition of 0.05 to 0.5 wt %, preferably 0.1 to 0.2 wt%, vinylamine polymer, based on fiber, to the aqueous cellulose fiber slurry (wet-end) provides for an increase in the dry strength of the paper product and an increase in the retention of titanium dioxide in those papermaking processes that use TiO<sub>2</sub>." Moreover, Lai's claims expressly state that "the improvement . . . comprises the addition of 0.05 to 0.5 wt %, based on fiber, of a poly(vinylamide) of at least 10<sup>6</sup> average molecular weight and at least 10% hydrolyzed to vinylamine units" (Lai, p. 9, Claims 1 and 9). In comparison, Applicant's Specification reports improved TiO<sub>2</sub> retention using "less than 0.05 %" of the cationic polymer, Applicant claims a process for improved TiO<sub>2</sub> retention using "less than 0.05 %" of the cationic polymer, Lai does not show improved TiO<sub>2</sub> retention using "less than 0.1 %" of its vinylamine polymer, and Lai does not claim to be able to improve TiO<sub>2</sub> retention using less than 0.05 wt %, based on fiber, of a poly(vinylamide) of at least 10<sup>6</sup> average molecular weight and at least 10% hydrolyzed to vinylamine units. Persons having ordinary skill in the art reasonably would not have expected to achieve any improvement in TiO<sub>2</sub> retention using "less than 0.05 %" of any vinylamine polymer Lai discloses. Unlike Applicant, Lai did not use less than 0.05 wt %, based on fiber, of a poly(vinylamide) which is acid hydrolyzed to cationic vinylamine salt units. Had Lai done so, Lai would have reported improved retention. To the contrary, Lai instructs persons having ordinary skill in the art to use at least 0.05 wt% of poly(vinylamide) which is acid or base hydrolyzed to vinylamine units to achieve improved TiO<sub>2</sub> retention. Lai

would have taught persons having ordinary skill in the art that using less than 0.05 wt% of poly(vinylamide) which is acid or base hydrolyzed to vinylamine units does not improve TiO<sub>2</sub> retention.

More importantly, Lai does not show that the TiO<sub>2</sub> retention which was achieved using 0.01 to less than 0.05 wt% of poly(vinylamide) which is hydrolyzed to vinylamine units is any different from the TiO<sub>2</sub> retention which is to be expected using 0 wt% of that or any other polymer commonly used to improve filler retention. Table 1 of Applicant's Specification reports the results of a comparison of the opacity and light transmission achieved using 0.01 % of a cationic polyacrylamide retention aid to the opacity and light transmission achieved using no polymer. Table 1 shows no significant difference. On the other hand, the opacity and light transmission Applicant achieved when adding 0.012 % of the cationic polymers defined in Applicant's Claim 4 were remarkably improved over 0.01 % of a conventional cationic polyacrylamide retention aid. To the contrary, Lai's Table 4 shows no significant difference in the TiO<sub>2</sub> retention achieved using VAm (80 M) in comparison to PAM (2-4 MM)(Polyacrylamide). The evidence as a whole indicates that the TiO<sub>2</sub> retention Lai achieved using less than 0.05 wt% of the poly(vinylamide) which was hydrolyzed to vinylamine units was no better than the TiO<sub>2</sub> retention persons having ordinary skill in the art reasonably would be led to expect when adding either a conventional poly(vinylamide) retention polymer or no polymer at all. In that light, the results Applicant reports using the method currently claimed are quite surprising and unexpected.

Thus, the Examiner clearly erred when responding (OA, p. 2):

Regarding Lai et al, disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments [because] . . . "[a] known or obvious composition does not become patentable simply because it has been described as somewhat inferior to some other product for the same use." In re Gurley, 27 F.3d 551, 554 . . . (Fed. Cir. 1994).

The evidence does not merely show that using less than 0.05 wt% of poly(vinylamide) which is hydrolyzed to vinylamine units was “somewhat inferior” than the TiO<sub>2</sub> retention achievable using at least 0.05 wt%, preferably at least 0.1 wt%, of the hydrolyzed polymer. The evidence of record, including Lai’s Table 4 and Applicant’s Table 1, shows that using less than 0.05 wt% of poly(vinylamide) which is hydrolyzed to vinylamine units is no better than the TiO<sub>2</sub> retention to be achieved using no polymer at all. In other words, the evidence reasonably would have taught persons having ordinary skill in the art that using less than 0.05 wt% of poly(vinylamide) which is hydrolyzed to vinylamine units is a complete waste of product, time, and effort. The evidence of record most certainly does teach away from the method Applicant claims.

The evidence of record strongly suggests that Lai’s process is not the same or substantially the same as the process Applicant claims. Lai does not reasonably suggest Applicant’s claimed method and persons having ordinary skill in the art reading Lai’s disclosure and results reasonably would not have expect the success achieved using Applicant’s claimed method as is required for a conclusion of obviousness. *In re O’Farrell*, 853 F.2d 894, 903 (Fed. Cir. 1988). The weight of the evidence of record as a whole favors the patentability of Applicant’s claimed method. Accordingly, the Examiner’s rejection over Lai properly should be withdrawn.

Rejection of Claims 4-8 under 35 U.S.C. 103 over Hartmann in view of Utecht and Lai

Previously presented Claims 4-8 stand finally rejected under 35 U.S.C. 103 over Hartmann (U.S. Patent 5,008,321, issued April 16, 1991) in view of Utecht (U.S. Patent 6,184,310, issued February 6, 2001) and Lai. The rejection should be withdrawn.

The Examiner points to Hartmann’s Example 25 (Hartmann, col. 16, ll. 16-44) for a paper making aqueous slurry comprising 66 wt% pulp, 33 wt% kaolin, and 0.05-0.10 wt% of the polymer of Example 1, i.e., poly-N-vinylformamide which is 30% hydrolyzed by gaseous

hydrogen chloride (Hartmann, col. 10, ll. 13-55). While the Examiner finds that the paper so formed has an ash content of 18.2 wt% (Table 6: 33% initial kaolin x 55.2% ash retention = 18.2%), Hartmann does not suggest that either titanium dioxide or calcium carbonate is *prima facie* equivalent to kaolin as a filler or that the kaolin filler it used may be replaced by either titanium dioxide or calcium carbonate with reasonable expectation of the same filler retention percentage. Moreover, the content of polymer solids of 0.05 wt% in the paper made from the aqueous slurry of Hartmann's Example 25 is greater than the maximum solids content of cationic polymer permitted in Applicant's claimed method.

Applicant's Specification teaches (Spec., p. 1, l. 35, to p. 2, l. 5; emphasis added):

[W]hen compared to other papermaking fillers, the particle diameter of titanium dioxide is low and the yield at the time of papermaking in the papermaking machine is extremely low. Since the yield is low, build up and contamination of the papermaking machine and other ancillary equipment occurs. Hence, the frequency of cleaning of the papermaking machine is increased and a lowering of the production efficiency is brought about. Furthermore, waste originating in this build-up and contamination by the filler is incorporated into the paper, leading to the problem of a lowering of paper quality. This is not restricted to titanium dioxide and even when there are used fillers such as light calcium carbonate, if it is desired to increase the proportion of filler in the paper with the objective of enhancing the opacity it is necessary to increase the amount of filler added to the pulp slurry. However, in so doing, the amount of filler which is unfixed and is discharged into the white water system is also increased and the same kind of problems are brought about as in the case of the titanium dioxide above.

The Examiner must presume that the statements made in Applicant's enabling disclosure are true "unless there is reason to doubt the objective truth of the statements contained therein . . . ." *In re Marzocchi*, 439 F.2d 220, 223 (CCPA 1971). Therefore, persons having ordinary skill in the art without teaching to the contrary reasonably would not conclude that it would be *prima facie* obvious to replace the kaolin filler employed in Hartman's Example 25 with titanium oxide or calcium carbonate and reasonably expect the same or a similar filler retention percentage as that achieved using Hartmann's kaolin filler. The Examiner acknowledges that Hartmann does not disclose titanium dioxide or calcium carbonate.

To remedy the deficiencies in Hartmann's disclosure, the Examiner relies on Utecht's teaching (OA, pp. 8-9, bridging ¶). While Utecht discloses that carbamate-functionalized vinylamine polymers are useful as retention, drainage, and flocculation aids and as fixatives in papermaking (Utecht, Abstract; col. 6, ll. 56-58) in amounts ranging from 0.01-0.1 wt% based on the dry fiber materials (Utrecht, col. 7, ll. 2-13), the reference suggests that their utility as retention aids pertains to large quantities of "contraries" (Utecht, col. 7, ll. 4-13). Utecht expressly states that the same carbamate-functionalized vinylamine polymers are "useful as emulsifiers for preparing aqueous filler slurries which are used for example in the preparation of filled papers. Examples of suitable fillers are clay, chalk, titanium dioxide and kaolin" (Utecht, col. 7, ll. 14-18; emphasis added). The capacity for filler retention appears to be unrelated to the capacity to emulsify or disperse fillers. Utecht does not suggest that its carbamate-functionalized vinylamine polymers are useful as retention agents for titanium dioxide and calcium carbonate.

Moreover, Utecht reasonably would not have suggested to a person having ordinary skill in the art that its carbamate-functionalized vinylamine polymers would or could act on titanium dioxide and calcium carbonate in the same manner and to the same degree as Hartmann's poly-N-vinylformamide which is 30% hydrolyzed acts on kaolin. While Utecht's carbamate-functionalized vinylamine polymers and Hartmann's poly-N-vinylformamide which is 30% hydrolyzed by gaseous hydrogen chloride both include a significant portion of vinylamine polymer units, there is no reasonable suggestion in Utecht that its carbamate-functionalized vinylamine polymers are cationic and no reasonable suggestion in either reference that persons having ordinary skill in the art would or could have expected the same or a similar degree of retention of titanium dioxide and calcium carbonate in paper that Hartman achieved for kaolin when adding poly-N-vinylformamide which is 30% hydrolyzed by gaseous hydrogen chloride to the pulp slurry in view of Utecht's

teaching that carbamate-functionalized vinylamine polymers generally will effectively emulsify or disperse a variety of fillers including clay, chalk, titanium dioxide and kaolin.

The evidence as a whole would not have led persons having ordinary skill in the art reasonably to expect the same or similar results using the two distinct kinds of polymers even though both have a portion of vinylamine polymer units. For the reasons stated, the rejections of Applicant's Claims over Hartmann in view of Utecht and Lai should be withdrawn.

Rejection of Claim 8 over Lai or Hartmann and Utecht in view of Takashata, Snow, & Koichi

Previously presented Claim 8 stands rejected under 35 U.S.C. 103 over Lai or Hartmann and Utecht, in view of Takashata (U.S. Patent 3,933,558, issued January 20, 1976), Snow (U.S. Patent 5,830,318, issued November 3, 1998), and Koichi (Japan, 09-217292, published August 19, 1997). The rejection should be withdrawn for the reasons stated with regard to the final rejections of Claims 4-8 under 35 U.S.C. 103 over Lai or Hartmann in view of Utecht and Lai. Takashata, Snow, and Koichi are relied upon by the Examiner to show that the specific kinds of papers recited in previously presented Claim 8 conventionally employ a content of titanium dioxide and/or calcium carbonate fillers within the range of 3-40 wt% for desirable opacity (OA, pp. 10-11). However, Takashata, Snow, and Koichi, either alone or in combination, do not remedy the deficiencies of the teachings of Lai or Hartmann and Utecht relating to Claim 4. Accordingly, the rejections should be withdrawn.



Application No. 10/581,459  
Reply to Office Action of September 1, 2009

For the reasons stated herein, Applicant's claims are unobvious over the prior art and in condition for allowance. Early Notice of Allowance is respectfully requested.

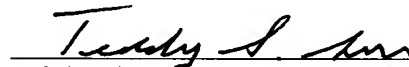
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